

BIOTIC COMMUNITY

Selection of subwatershed segments, subsegments, and representative reaches for fish sampling was based on stream order, flow, and stream complexity. Fisheries personnel evaluated the fish community on all third-order or larger streams (Figure 6). In addition, site selection procedures consisted of (1) constructing gradient plots of potential areas to aid in the selection of sites with varying gradients, (2) consulting a topographic map or aerial photos for surrounding land use and access to sites, and (3) viewing video tapes of the watershed areas. Final selection was based on relative differences of the areas and access to the sites. For ease of stream assessment and avoidance of trespass, a ford or a bridge was often near or part of a site.

Fish community collections were made by the Fisheries Research and Fisheries Management sections. A variety of microhabitat types were sampled within a riffle-pool-riffle complex. On occasion, a run was included in the sample site. Depending on the site, biologists worked up or down stream of the ford, bridge, or access point until habitat within the riffle-pool-riffle complex had been sampled. Fisheries Research Section typically used the drag-seine for pool and run areas and the kick-seine to sample benthic species in riffles. East Central Region Fisheries Management Personnel performed stream sampling of reaches using a backpack electroshocker or a boat boom-electroshocker. Regional Fisheries Staff used electrofishing as the primary sampling method and supplemented some collections with seining.

A total of 90 fish species have been collected by Missouri Department of Conservation fisheries biologists from 1941-96 (Table 20). In historic fish collections, prior to the 1995-96 collections, fisheries biologists found 81 fish species.

In the 1995-96 survey, nine additional fish species were added to the list: freshwater drum, highfin carpsucker, fantail darter, chestnut lamprey, smallmouth buffalo, bigmouth buffalo, warmouth, western redbfin shiner, and freckled madtom. However, seven fish species (bolded on Table 20) have not been collected in the watershed since 1963 or 1941. These include the pallid shiner that is considered extirpated from Missouri (Pflieger 1997) and has not been collected since 1941. One state-listed endangered species, the highfin carpsucker (*Carpododes velifer*), was collected in the 1995-96 collections.

The Bourbeuse River tends to be more turbid and less steep in gradient than other Ozark streams. It is home to most of the popular sport fish found in Missouri. Most float anglers fish the Bourbeuse in the spring, before base flows limit their ability to move between access points. Many anglers fish the river from its banks or fish only the pool along their private property, especially during the low water periods.

The black bass and rock bass populations have been sampled extensively, especially in those reaches below Highway 185. Smallmouth bass densities are relatively high with a good proportion of fish larger than the 12-inch minimum length limit. Eighteen-inch or larger fish can be found in association with cover, deep water, and current. Largemouth bass are also present in every pool. In any given sample, the largest bass would almost always be a largemouth. Found only below Goodes Mill in samples taken during the early 1990s, spotted bass have progressively been sampled farther upstream. Now they can be found all the way up the river to the Noser Mill Dam and will likely continue to expand their range further upstream. Spotted bass body condition has thus far been excellent. Because spotted bass are relatively new to the river system, it is difficult to determine whether they are occupying a niche created by the degradation of habitat or they are displacing one of the other black bass species. Rock bass can be found throughout the watershed, however, they do not represent a significant component of the fish samples except in the lower river near Union.

Channel catfish and flathead catfish have not been targeted for any extensive management evaluations to date. Typically, catfish species were collected while doing other investigations. Good numbers of channel catfish are apparently available, and channel catfish larger than three pounds are fairly common. Moderate fishing pressure occurs for channel catfish using both rod and reel as well as set and trot lines. Flathead catfish are caught by anglers in the lower portions of the Bourbeuse River.

Walleye and sauger are present in the river. Some population investigations have occurred during their spring spawning run. River walleye are difficult to sample due to the effect of temperature and flow on the timing of their spawning. Age and growth analysis from these evaluations indicate a self-sustaining, but low density population, with excellent growth. Local anglers have commented that walleye do not seem to spawn every year below Noser Mill. Sampling done in that reach supports their claim. Most of the walleye sampled during our evaluations were male and exceeded 18 inches total length. Most Bourbeuse River walleye are caught by anglers fishing for other species, especially black bass. Sauger are common below the I-44 Bridge. Almost all sauger caught in the Bourbeuse River were yearlings, indicating that it is an important nursery area to the Meramec River sauger population.

Redhorse and suckers are abundant in the Bourbeuse River. Anglers target them during two seasons of the year. It is popular sport to drift night crawlers in the shoals in March and April. However, the majority of redhorse and suckers are harvested by giggers, especially late in the season when the water clears.

Rainbow trout are found in Kratz Spring Branch and the lower end of Spring Creek in Franklin County. A few trout can be found in the

Table 20. Fish species collected within the Bourbeuse River watershed. Represented are both Missouri Department of Conservation Fisheries Research Section (Pflieger) and Fisheries Management Section with corresponding collection year. Historic collections – 1941-92. Recent collections – 1993-96. Bolded species names are those not recently collected (in 30-50 years).

Species Scientific Name	Common Name	Collection Year
<u>Petromyzontidae (Lampreys)</u>		
<i>Ichthyomyzon castaneus</i>	Chestnut lamprey	1996
<i>Ichthyomyzon</i>	Larval lamprey	1995,96
<i>Lampetra aepyptera</i>	Least brook lamprey	1963
<u>Lepisosteidae (Gars)</u>		
<i>Lepisosteus osseus</i>	Longnose gar	1941,42,63,92,95,96
<u>Clupeidae (Shad)</u>		
<i>Dorosoma cepedianum</i>	Gizzard shad	1963,96
<u>Hiodontidae (Mooneyes)</u>		
<i>Hiodon alosoides</i>	Goldeye	1963
<u>Esocidae (Pikes)</u>		
<i>Esox americanus</i>	Grass pickerel	1941,62,63,95
<u>Cyprinidae (Minnows)</u>		
<i>Campostoma oligolepis</i>	Largescale stoneroller	1941,42,62,63,83,84,92,94,95,96
<i>Campostoma anomalum</i>	Central stoneroller	1941,42,61,62,63,83,84,92,94,95,96
<i>Carassius auratus</i>	Goldfish	1992
<i>Cyprinella whipplei</i>	Steelcolor shiner	1941,42,62,63,84,92,94,95,96
<i>Cyprinella lutrensis</i>	Red shiner	1941
<i>Cyprinella spiloptera</i>	Spotfin shiner	1941,42,62,63,84,92,94,96
<i>Cyprinus carpio</i>	Common carp	1963,96
<i>Erimystax x-punctatus</i>	Gravel chub	1941,42,63,95,96
<i>Luxilus chrysocephalus</i>	Striped shiner	1941,42,61,62,63,83,84,92,94,95,96

<i>Luxilus zonatus</i>	Bleeding shiner	1992,94,95,96
<i>Lythrurus u umbratilis</i>	Western redbfin shiner	1995,96
<i>Lythrurus u cyanocephalus</i>	Eastern redbfin shiner	1941,42,62,63,84,92,94
<i>Macrhybopsis storeriana</i>	Silver chub	1992
<i>Nocomis biguttatus</i>	Hornyhead chub	1941,83,94,95
<i>Notemigonus crysoleucas</i>	Golden shiner	1941,63,95
<i>Notropis volucellus</i>	Mimic shiner	1941,63,95,96
<i>Notropis rubellus</i>	Rosyface shiner	1942,63,84,92,95,96
<i>Notropis stramineus</i>	Sand shiner	1941,63,92,94,95,96
<i>Notropis boops</i>	Bigeye shiner	1941,62,63,84,92,94,95,96
<i>Notropis amnis</i>	Pallid shiner	1941
<i>Notropis amblops</i>	Bigeye chub	1941,92,94,95,96
<i>Notropis atherinoides</i>	Emerald shiner	1963,95,96
<i>Notropis dorsalis</i>	Bigmouth shiner	1941,63
<i>Notropis buccatus</i>	Silverjaw minnow	1963,94,95
<i>Notropis greenei</i>	Wedgespot shiner	1992,95,96
<u>Cyprinidae (Minnows)</u>		
<i>Phenacobius mirabilis</i>	Suckermouth minnow	1941,42,63
<i>Phoxinus erythrogaster</i>	Southern redbelly dace	1963,94,95
<i>Pimephales vigilax</i>	Bullhead minnow	1963
<i>Pimephales promelas</i>	Fathead minnow	1963,94
<i>Pimephales notatus</i>	Bluntnose minnow	1941,42,61,62,63,84,92,94,95,96
<i>Semotilus atromaculatus</i>	Creek chub	1941,63,83,94,95,96
<u>Catostomidae (Suckers)</u>		
<i>Carpiodes velifer</i>	Highfin carpsucker	1996

<i>Carpiodes cyprinus</i>	Quillback	1963,96
<i>Catostomus commersonni</i>	White sucker	1941,63,94,95
<i>Erimyzon oblongus</i>	Creek chubsucker	1941,62,63,83,92,95
<i>Hypentelium nigricans</i>	Northern hog sucker	1941,63,92,94,95,96
<i>Ictiobus bubalus</i>	Smallmouth buffalo	1995,96
<i>Ictiobus cyprinellus</i>	Bigmouth buffalo	1996
<i>Minytrema melanops</i>	Spotted sucker	1962,63,92,95,96
<i>Moxostoma duquesnei</i>	Black redhorse	1941,63,92,94,95,96
<i>Moxostoma carinatum</i>	River redhorse	1963,96
<i>Moxostoma erythrurum</i>	Golden redhorse	1941,62,63,92,94,95,96
<i>Moxostoma anisurum</i>	Silver redhorse	1941,63,92,94,96
<i>Moxostoma macrolepidotum</i>	Shorthead redhorse	1963,95,96
<u>Ictaluridae (Catfishes)</u>		
<i>Ameiurus melas</i>	Black bullhead	1941,63,84,95,96
<i>Ameiurus natalis</i>	Yellow bullhead	1941,63,83,92, 95, 96
<i>Ictalurus punctatus</i>	Channel catfish	1942,63,95,96
<i>Noturus exilis</i>	Slender madtom	1962,84,92,94,95,96
<i>Noturus flavus</i>	Stonecat	1963,95,96
<i>Noturus nocturnus</i>	Freckled madtom	1995,96
<i>Pylodictis olivaris</i>	Flathead catfish	1941,63,95,96
<u>Cyprinodontidae (Killifishes)</u>		
<i>Fundulus olivaceus</i>	Blackspotted topminnow	1992,94,95,96
<i>Fundulus catenatus</i>	Northern studfish	1941,42,63,84,92,94,95,96
<i>Fundulus notatus</i>	Blackstripe topminnow	1941,42,61,62,63,84,92,95,96
<u>Poeciliidae (Livebearers)</u>		

<i>Gambusia affinis</i>	Mosquitofish	1992,94,95,96
<u>Atherinidae (Silversides)</u>		
<i>Labidesthes sicculus</i>	Brook silverside	1941,42,62,63,83,84,92,94,95,96
<u>Cottidae (Sculpins)</u>		
<i>Cottus carolinae</i>	Banded sculpin	1992,95
<i>Cottus bairdi</i>	Mottled sculpin	1963,94, 95
<u>Centrarchidae (Basses)</u>		
<i>Ambloplites rupestris</i>	Rock bass	1941,42,63,92,94,95,96
<i>Lepomis megalotis</i>	Longear sunfish	1941,51,62,63,84,92,94,95,96
<i>Lepomis macrochirus x Lepomis megalotis</i>	Bluegill x longear sunfish	1995,96
<i>Lepomis macrochirus</i>	Bluegill	1941,42,61,62,63,83,84,92,94,95,96
<i>Lepomis humilis</i>	Orangespotted sunfish	1941,42,63
<i>Lepomis gulosus</i>	Warmouth	1995
<i>Lepomis cyanellus x Lepomis megalotis</i>	Green sunfish x longear sunfish	1995,96
<i>Lepomis cyanellus x Lepomis macrochirus</i>	Green sunfish x bluegill	1995,96
<i>Lepomis cyanellus</i>	Green sunfish	1941,42,61,62,63,83,92,95,96
<i>Micropterus salmoides</i>	Largemouth bass	1941,61,62,63,92,94,95,96
<i>Micropterus punctulatus</i>	Spotted bass	1941,92,95,96
<i>Micropterus dolomieu</i>	Smallmouth bass	1941,42,61,62,63,92,94,95,96
<i>Pomoxis anularis</i>	White crappie	1941,63,95,96
<i>Pomoxis nigromaculatus</i>	Black crappie	1941,96
<u>Percidae (Perches)</u>		
<i>Etheostoma tetrazonum</i>	Missouri saddled	1941,62,63,92,94,95,96
<i>Etheostoma s spectabile</i>	Northern orangethroat	1941,61,62,63,83,84,92,94,95,96

<i>Etheostoma f lineolatum</i>	Striped fantail	1941,42,61,62,63,83,84,92,94,95,96
<i>Etheostoma blennioides</i>	Greenside darter	1941,42,62,63,83,84,92,94,95,96
<i>Etheostoma punctulatum</i>	Stippled	1963,92
<i>Etheostoma nigrum</i>	Johnny darter	1941,61,62,63,84,92,94,95,96
<i>Etheostoma zonale</i>	Banded darter	1941,62,63,92,94,95,96
<i>Etheostoma f flabellare</i>	Barred fantail darter	1995,96
<i>Etheostoma caeruleum</i>	Rainbow darter	1941,42,62,63,83,84,92,94,95,96
<i>Percina c caprodes</i>	Ohio logperch	1941,62,63,95,96
<i>Percina phoxocephala</i>	Slenderhead darter	1941,42,62,63,95,96
<i>Percina c fulvitaenia</i>	Ozark logperch	1984,92,94,95,96
<i>Percina evides</i>	Gilt darter	1942,63,95,96
<i>Stizostedion vitreum</i>	Walleye	1963,1996
<u>Sciaenidae (Drums)</u>		
<i>Aplodinotus grunniens</i>	Freshwater drum	1996

Table 21. Numbers and relative abundance of living naiades found in the Bourbeuse River watershed (hydrologic unit # 07140103) and some of its major tributaries (Buchanan 1980).

Species	<u>Bourbeuse River</u>		<u>Brush Creek</u>		<u>Dry Fork</u>		<u>Little Bourbeuse River</u>	
	No.	%	No.	%	No.	%	No.	%
<i>Actinonaias ligamentina carinata</i> (Mucket)	1,074	14.7	-	-	-	-	-	-
<i>Alasmidonta viridis</i> (Slippershell mussel)	1	**	-	-	-	-	-	-
<i>Alasmidonta marginata</i> (Elktoe)	46	0.6	-	-	-	-	-	-
<i>Amblema p. plicata</i> (Threeridge)	299	4.1	-	-	-	-	-	-
<i>Anodontoides ferussacianus</i> (Cylindrical papershell)	-	-	2	0.8	1	2.8	-	-
<i>Ellipsaria lineolata</i> (Butterfly)	18	0.2	-	-	-	-	-	-
<i>Elliptio dilatata</i> (Spike)		7.2	2	0.8	-	-	--	-
<i>Epioblasma triquetra</i> (Snuffbox)	16	0.2	-	-	-	--	-	-
<i>Fusconaia flava</i> (Pig toe)	288	3.9	-	--	--	-	-	-
<i>Lampsilis teres</i> (Yellow sandshell)	1	**	-	-	-	-	-	-
<i>Lampsilis t. teres</i> (Slough sandshell)	85	1.2	-	-	-	-	-	-
<i>Lampsilis cardium</i> (Pocketbook)	843	11.5	17	6.7	1	2.8	1	5.9
<i>Lampsilis reeviana britts</i> (Britt's shell)	22	0.3	-	-	-	-	--	-
<i>Lampsilis siliquoidea</i> (Fat mucket)	2,170	29.7	104	40.9	17	48.6	4	23.5
<i>Lasmigona complanata</i> (White heelsplitter)	17	0.2	-	-	-	-	-	-
<i>Lasmigona costata</i> (Fluted shell)	79	1.1	-	-	-	-	-	-
<i>Leptodea leptodon</i> (Scale shell)	1	**	-	-	-	-	-	-

<i>Leptodea fragilis</i>(Fragile papershell)	66	0.9	-	-	--	-	-	-
<i>Ligumia subrostrata</i>(Pond mussel)	24	0.3	3	1.2	-	-	5	29.4
<i>Ligumia recta</i> (Black sandshell)	23	0.3	-	--	-	-	-	-
<i>Megalonaias nervosa</i>(Washboard)	4	0.1	-	-	-	-	-	-
<i>Obliquaria reflexa</i>(Three-horned wartyback)	6	0.1	-	-	-	-	-	-
<i>Plethobasus cyphyus</i>(Bullhead)	10	0.1	-	-	-	-	-	-
<i>Pleurobema sintoxia</i>(Round pigtoe)	241	3.3	-	-	--	-	-	-
<i>Potamilus alatus</i>(Pink heelsplitter)	123	1.7	-	--	-	-	-	-
<i>Potamilus ohiensis</i>(Fragile heelsplitter)	1	**	-	--	-	-	-	-
<i>Pyganandon g. grandis</i>(Giant floater)(Floater)(gai(ss	254	3.5	10	3.6	14	40.0	6	35.3
<i>Quadrula metanevra</i>(Monkeyface)	2	**	-	-	-	--	-	-
<i>Quadrula pustulosa</i>(Pimpleback)	195	2.7	-	-	-	-	-	-
<i>Simpsonaias ambigua</i>(Salamander mussel)	5	0.1	-	-	--	--	-	-
<i>Strophitus u. undulatus</i> (Squaw foot)	125	1.7	9	3.1	1	2.8	-	-
<i>Toxolasma parvus</i>(Lilliput mussel)	19	0.3	-	-	--	-	-	-
<i>Tritogonia verrucosa</i>(Buckhorn)	117	1.6	1	0.4	-	-	-	-
<i>Truncilla donaciformis</i>(Fawn's foot)	5	0.1	-	-	-	-	-	-
<i>Truncilla truncata</i>(Deartoe)	19	0.3	-	-	-	-	-	-

<i>Utterbackia imbecillis</i>(Paper pond shell)	189	2.6	3	1.2		1	5.9	-
<i>Venustaconcha e. ellipsiformis</i> (Ellipse)	391	5.4	104	40.9	1	2.8	-	-
Total	9,470		75		237		265	-

**** = less than 0.1% of total**

Table 22. Living and dead mussel species collected from 1994-97 within streams of the Bourbeuse River watershed (Missouri Department of Conservation Fisheries Research Collection 1997; Roberts and Bruenderman 1997).

Notes: ¹ Former candidate species category 2 is no longer federally listed. # = Missouri species of conservation concern. E = endangered. D = represented by dead mussel shell material.

Stream	Stream Order	Year	Federal Status	D	State Status	Species Scientific Name	Species Common Name
Bourbeuse River	6	94				<i>Venustaconcha ellipsiformis</i>	Ellipse
Bourbeuse River	6	95				<i>Lasmigona costata</i>	Fluted shell
Bourbeuse River	6	95				<i>Lampsilis teres</i>	Yellow sandshell
Bourbeuse River	6	97				<i>Actinonaias ligamentina</i>	Mucket
Bourbeuse River	6	97	C2 ¹		#	<i>Alasmidonta marginata</i>	Elktoe
Brush Creek	4	97		D		<i>Amblema plicata</i>	Threeridge
Bourbeuse River	6	97				<i>Amblema plicata</i>	Threeridge
Bourbeuse River	6	97		D		<i>Arcidens confragosus</i>	Rock pocketbook
Bourbeuse River	6	97				<i>Cumberlandia monodonta</i>	Spectacle-case
Bourbeuse River	6	97				<i>Cyclonaias tuberculata</i>	Purple wartyback
Bourbeuse River	6	97				<i>Ellipsaria lineolata</i>	Butterfly
Bourbeuse River	6	97				<i>Elliptio dilatata</i>	Spike
Bourbeuse River	6	97	C2		#	<i>Epioblasma triquetra</i>	Snuffbox
Bourbeuse River	6	97				<i>Fusconaia flava</i>	Wabash pigtoe
Bourbeuse River	6	97				<i>Lampsilis cardium</i>	Pocketbook

Table 23. Location, total specimens, and the site percentage composition of crayfish species within the Bourbeuse River watershed (Missouri Department of Conservation 1995a) ¹ USGS 14-digit Hydrologic Unit (HU) Code – 07140103-

(HU) ¹	Stream name	TwN	Rng	Sec	Collection Date	Species	Total Speci-mens	% Com-position
100-001	Webber Creek	42N	01W	5	03/22/86	<i>Orconectes punctimanus</i> (Spothanded crayfish)	8	36.4
100-001	Webber Creek	42N	01W	5	03/22/86	<i>Orconectes virilis</i> (Northern crayfish)	14	63.6
090-002	Unnamed Creek	40N	06W	1	10/10/83	<i>Orconectes punctimanus</i> (Spothanded crayfish)	17	100.0
090-002	Brush Creek	40N	04W	18	03/27/84	<i>Cambarus diogenes</i> (Devil crayfish)	3	7.3
090-002	Brush Creek	40N	04W	18	03/27/84	<i>Orconectes luteus</i> (Golden crayfish)	33	80.5
090-002	Brush Creek	40N	04W	18	03/27/84	<i>Orconectes punctimanus</i> (Spothanded crayfish)	5	12.2
090-002	McDade Branch	39N	05W	16	10/10/83	<i>Orconectes luteus</i> (Golden crayfish)	47	77.0
090-002	McDade Branch	39N	05W	16	10/10/83	<i>Orconectes punctimanus</i> (Spothanded crayfish)	14	23.0
090-001	Living Well Creek	40N	06W	13	10/10/83	<i>Orconectes punctimanus</i> (Spothanded crayfish)	5	100.0
090-001	Living Well Creek	40N	06W	13	09/17/85	<i>Orconectes punctimanus</i> (Spothanded crayfish)	24	100.0
090-001	Mint Spring	40N	06W	13	10/10/83	<i>Orconectes luteus</i> (Golden crayfish)	2	6.9
090-001	Mint Spring	40N	06W	13	10/10/83	<i>Orconectes punctimanus</i> (Spothanded crayfish)	27	93.1
020-001	Bourbeuse River S5	38N	07W	12	10/19/84	<i>Orconectes luteus</i> (Golden crayfish)	48	76.2
020-001	Bourbeuse River S5	38N	07W	12	10/19/84	<i>Orconectes punctimanus</i> (Spothanded crayfish)	15	23.8

Table 24. Crayfish species diversity (Shannon) and richness (Margalef) within subwatersheds of the Bourbeuse River watershed (Missouri Department of Conservation 1995a)

Basin (USGS)¹	Stream name	TwN	Rng	Sec	Date	Shannon²	Margalef²
100-001	Webber Creek	42N	01W	5	03/22/86	0.655	0.324
090-002	Unnamed Creek	40N	06W	1	10/10/83	0	0
090-002	Brush Creek	40N	04W	18	03/27/84	0.623	0.539
090-002	McDade Branch	39N	05W	16	10/10/83	0.539	0.243
090-001	Living Well Creek	40N	06W	13	10/10/83	0	0
090-001	Living Well Creek	40N	06W	13	09/17/85	0	0
090-001	Mint Spring	40N	06W	13	10/10/83	0.251	0.297
020-001	Bourbeuse River S5	38N	07W	12	10/19/84	0.549	0.241

¹ USGS Hydrologic Unit Code -- 07140103 ² diversity or richness for the site.

Table 25. Benthic Macroinvertebrate Collections for the Bourbeuse River from 1962-1963 (printout from the Fisheries Research Benthic Collection)

Order	Species	Stream
	Crustacea	
Amphipoda	<i>Hyalella azteca</i> (Saussure)	Bourbeuse River
Decapoda	<i>Orconectes longidigitus</i> (Faxon)	Bourbeuse River
-	<i>Orconectes marchandi</i> Hobbs	Bourbeuse River
-	-	Brush Creek
--	-	Dry Fork Bourbeuse River
-	<i>Orconectes virilis</i> (Hagen)	Red Oak Creek
Megagastropoda	<i>Elimia potosiensis plebeius</i> (Gould)	Bourbeuse River
-	<i>Pleurocera acuta</i> Rafinesque	Bourbeuse River
-	<i>Pleurocera</i> sp.	Bourbeuse River
-	Insecta	-
Coleoptera	<i>Berosus</i> sp.	Bourbeuse River
-	-	Red Oak Creek
-	<i>Dineutus</i> sp.	Bourbeuse River
-	-	Brush Creek
-	-	Red Oak Creek
-	<i>Dubiraphia bivittata</i> (LeConte)	Bourbeuse River
-	-	Dry Fork Bourbeuse River
-	<i>Dytiscus</i> sp.	Brush Creek
-	<i>Ectopria nervosa</i> (Melsheimer)	Bourbeuse River
-	-	Dry Fork Bourbeuse River
-	<i>Gyrinus</i> sp.	Bourbeuse River
-	<i>Helichus lithophilus</i> (Germar)	Boone Creek
-	-	Bourbeuse River
-	-	Brush Creek

-	-	Dry Fork Bourbeuse River
-	-	Red Oak Creek
-	<i>Macronychus glabratus Say</i>	Bourbeuse River
-	<i>Microcylloepus pusillus pusillus (LeConte)</i>	Bourbeuse River
-	<i>Optioservus sandersoni Collier</i>	Boone Creek
-	-	Bourbeuse River
-	-	Brush Creek
-	<i>Psephenus herricki (DeKay)</i>	Boone Creek
-	-	Bourbeuse River
-	-	Brush Creek
-	--	Dry Fork Bourbeuse River
-	<i>Stenelmis sp.</i>	Boone Creek
-	-	Bourbeuse River
-	-	Brush Creek
-	<i>Atherix lantha Webb</i>	Boone Creek
-	-	Bourbeuse River

-	-	Brush Creek
-	<i>Bezzia/Probezzia...</i>	Boone Creek
--	<i>Bezzia/Probezzia...</i>	Bourbeuse River
-	-	Brush Creek
-	-	Red Oak Creek
-	<i>Ceratopogonidae</i>	Bourbeuse River
-	<i>Chironomidae</i>	Boone Creek
-	-	Bourbeuse River
-	-	Brush Creek
-	-	Dry Fork Bourbeuse River

-	-	Red Oak Creek
-	<i>Empididae</i>	Bourbeuse River
-	-	Brush Creek
-	<i>Hemerodromia rogatoris Coquillett</i>	Bourbeuse River
-	<i>Hexatoma sp.</i>	Boone Creek
-	-	Bourbeuse River
-	-	Brush Creek
-	-	Dry Fork Bourbeuse River
-	-	Red Oak Creek
-	-	Bourbeuse River
-	<i>Simuliidae</i>	Boone Creek
-	-	Bourbeuse River
-	-	Brush Creek
-	-	Dry Fork Bourbeuse River
-	-	Red Oak Creek
-	<i>Tabanidae</i>	Boone Creek
-	-	Bourbeuse River
-	-	Brush Creek
-	-	Dry Fork Bourbeuse River
-	-	Red Oak Creek
-	<i>Tipula sp.</i>	Boone Creek
-	-	Bourbeuse River
-	-	Brush Creek
-	-	Dry Fork Bourbeuse River
-	<i>Tipulidae</i>	Bourbeuse River
Ephemeroptera	<i>Acentrella sp.</i>	Boone Creek
-	-	Bourbeuse River

-	-	Brush Creek
-	-	Red Oak Creek
-	<i>Anthopotamus sp.</i>	Boone Creek
-	-	Bourbeuse River
-	-	Brush Creek
-	<i>Baetidae</i>	Bourbeuse River
-	<i>Baetidae</i>	Red Oak Creek

-	-	Brush Creek
-	<i>Bezzia/Probezzia...</i>	Boone Creek
-	<i>Bezzia/Probezzia...</i>	Bourbeuse River
-	-	Brush Creek
-	-	Red Oak Creek
-	<i>Ceratopogonidae</i>	Bourbeuse River
-	<i>Chironomidae</i>	Boone Creek
-	-	Bourbeuse River
-	-	Brush Creek
-	-	Dry Fork Bourbeuse River
-	-	Red Oak Creek
-	<i>Empididae</i>	Bourbeuse River
-	-	Brush Creek
-	<i>Hemerodromia rogatoris Coquillett</i>	Bourbeuse River
-	<i>Hexatoma sp.</i>	Boone Creek
-	-	Bourbeuse River
-	-	Brush Creek
-	-	Dry Fork Bourbeuse River
-	-	Red Oak Creek
-	-	Bourbeuse River
-	<i>Simuliidae</i>	Boone Creek
-	-	Bourbeuse River
-	-	Brush Creek
-	-	Dry Fork Bourbeuse River
-	-	Red Oak Creek

-	<i>Tabanidae</i>	Boone Creek
-	-	Bourbeuse River
-	-	Brush Creek
-	-	Dry Fork Bourbeuse River
-	-	Red Oak Creek
-	<i>Tipula sp.</i>	Boone Creek
-	-	Bourbeuse River
-	-	Brush Creek
-	-	Dry Fork Bourbeuse River
-	<i>Tipulidae</i>	Bourbeuse River
Ephemeroptera	<i>Acentrella sp.</i>	Boone Creek
-	-	Bourbeuse River
-	-	Brush Creek
-	-	Red Oak Creek
-	<i>Anthopotamus sp.</i>	Boone Creek
-	-	Bourbeuse River
-	-	Brush Creek
-	<i>Baetidae</i>	Bourbeuse River
-	<i>Baetidae</i>	Red Oak Creek

-	-	Bourbeuse River
-	-	Brush Creek
-	-	Dry Fork Bourbeuse River
-	<i>Stenonema bednariki McCafferty</i>	Bourbeuse River
-	-	Brush Creek
-	-	Dry Fork Bourbeuse River
-	<i>Stenonema femoratum (Say)</i>	Boone Creek
-	-	Bourbeuse River
-	-	Brush Creek
-	-	Brush Creek
-	-	Dry Fork Bourbeuse River
-	-	Red Oak Creek
-	<i>Stenonema mediopunctatum (McDunnough)</i>	Boone Creek
-	-	Bourbeuse River
-	-	Brush Creek

-	-	Dry Fork Bourbeuse River
-	<i>Stenonema pulchellum (Walsh)</i>	Boone Creek
-	-	Bourbeuse River
-	-	Brush Creek
-	-	Dry Fork Bourbeuse River
-	<i>Stenonema terminatum (Walsh)</i>	Bourbeuse River
-	-	Brush Creek
-	<i>Tricorythodes sp.</i>	Boone Creek
-	-	Bourbeuse River
-	-	Brush Creek
-	-	Dry Fork Bourbeuse River
Lepidoptera	<i>Petrophila sp.</i>	Brush Creek
Megaloptera	<i>Corydalus cornutus (Linnaeus)</i>	Bourbeuse River
-	-	Brush Creek
-	-	Dry Fork Bourbeuse River
-	<i>Sialis sp.</i>	Bourbeuse River
-	-	Brush Creek
Odonata	-	Dry Fork Bourbeuse River
-	-	Red Oak Creek
-	<i>Argia moesta (Hagen)</i>	Boone Creek
-	-	Bourbeuse River
-	-	Brush Creek
-	-	Dry Fork Bourbeuse River
-	-	Red Oak Creek
-	<i>Dromogomphus sp.</i>	Bourbeuse River
-	<i>Dromogomphus spinosus Selys</i>	Boone Creek
-	-	Bourbeuse River
-	<i>Gomphidae</i>	Boone Creek

-	-	Bourbeuse River
-	--	Brush Creek
-	<i>Hetaerina americana (Fabricius)</i>	Boone Creek

-	-	Bourbeuse River
-	-	Brush Creek
-	<i>Macromia sp.</i>	Bourbeuse River
-	<i>Ophiogomphus rupinsulensis (Walsh)</i>	Bourbeuse River
-	-	Brush Creek
-	-	Dry Fork Bourbeuse River
-	<i>Ophiogomphus sp.</i>	Boone Creek
-	<i>Progomphus obscurus (Rambur)</i>	Boone Creek
-	-	Bourbeuse River
-	<i>Stylogomphus albistylus (Hagen)</i>	Brush Creek
-	<i>unidentified anisoptera</i>	Dry Fork Bourbeuse River
Plecoptera	<i>Acroneuria sp.</i>	Bourbeuse River
-	-	Brush Creek
-	-	Red Oak Creek
-	<i>Agnetina capitata (Pictet)</i>	Bourbeuse River
-	-	Dry Fork Bourbeuse River
-	<i>Allocaupnia sp.</i>	Boone Creek
-	-	Bourbeuse River
-	-	Brush Creek
-	<i>Allocaupnia sp.</i>	Dry Fork Bourbeuse River
-	-	Red Oak Creek
-	<i>Allocaupnia vivipara (Claassen)</i>	Red Oak Creek
-	<i>Amphinemura delosa (Ricker)</i>	Boone Creek
-	-	Bourbeuse River
-	-	Brush Creek
-	-	Red Oak Creek
-	<i>Hydroperla crosbyi (Needham & Claassen)</i>	Boone Creek

-	-	Bourbeuse River
-	-	Brush Creek
-	-	Dry Fork Bourbeuse River
-	-	Red Oak Creek
-	<i>Hydroperla sp.</i>	Bourbeuse River
-	-	Red Oak Creek
-	<i>Isoperla bilineata (Say)</i>	Boone Creek
-	-	Bourbeuse River
-	-	Brush Creek
-	<i>Isoperla mohri Frison</i>	Bourbeuse River
-	-	Red Oak Creek
-	<i>Isoperla nana (Walsh)</i>	Red Oak Creek
-	<i>Neoperla clymene (Newman)</i>	Bourbeuse River
-	-	Dry Fork Bourbeuse River
-	<i>Perlesta placida (Hagen)</i>	Boone Creek
-	-	Bourbeuse River
-	-	Brush Creek
-	<i>Perlidae</i>	Dry Fork Bourbeuse River
-	-	Red Oak Creek
-	<i>Perlinella drymo (Newman)</i>	Bourbeuse River
-	<i>Strophopteryx fasciata (Burmeister)</i>	Boone Creek
-	-	Bourbeuse River
-	-	Brush Creek
-	-	Dry Fork Bourbeuse River
-	<i>Taeniopteryx meteui (Ricker & Ross)</i>	Bourbeuse River
-	<i>Taeniopteryx sp.</i>	Bourbeuse River
-	-	Brush Creek
-	-	Dry Fork Bourbeuse River
-Trichoptera	<i>Agraylea multipunctata curtis</i>	Bourbeuse River
-	<i>Ceraclea flavus (Banks)</i>	Bourbeuse River
-	<i>Cheumatopsyche sp.</i>	Boone Creek
-	-	Bourbeuse River
-	-	Brush Creek
-	<i>Cheumatopsyche sp.</i>	Dry Fork Bourbeuse River
-	-	Red Oak Creek

-	<i>Chimarra aterrima hagen</i>	Boone Creek
-	<i>Chimarra obscura (walker)</i>	Boone Creek
-	-	Bourbeuse River
-	-	Brush Creek
-	-	Dry Fork Bourbeuse River
-	-	Red Oak Creek
-	<i>Helicopsyche borealis (Hagen)</i>	Bourbeuse River
-	<i>Hydropsyche cuanis ross</i>	Bourbeuse River
-	<i>Hydropsyche frisoni ross</i>	Bourbeuse River
-	<i>Hydroptilidae</i>	Bourbeuse River
-	<i>Oecetis avara (Banks)</i>	Bourbeuse River
-	<i>Oecetis inconspicua (Walker)</i>	Bourbeuse River
-	<i>Polycentropus sp.</i>	Brush Creek
-	<i>Pycnopsyche sp.</i>	Boone Creek
-	-	Bourbeuse River
-	-	Brush Creek
-	<i>Wormaldia moesta (Banks)</i>	Boone Creek
-	<i>Tricladida</i>	
-	<i>Planariidae</i>	Bourbeuse River
-	-	Brush Creek
-	-	Dry Fork Bourbeuse River
-	-	Red Oak Creek
-	<i>Veneroida</i>	
-	<i>Sphaeriidae</i>	Boone Creek
-	-	Bourbeuse River
-	-	Brush Creek
-	-	Dry Fork Bourbeuse River
-	<i>Miscellaneous Groups</i>	
Lymnophila	<i>Ferrissaia fragilis (Tryon)</i>	Bourbeuse River
-	-	Brush Creek

-	-	Dry Fork Bourbeuse River
-	<i>Lymnaea (Stagnicola) sp.</i>	Bourbeuse River
-	<i>Lymnaeidae</i>	Dry Fork Bourbeuse River
-	<i>Physidae</i>	Boone Creek
-	-	Bourbeuse River
-	-	Brush Creek
-	-	Dry Fork Bourbeuse River
-	<i>Planorbidae</i>	Bourbeuse River
-	<i>Hirudinea</i>	Boone Creek
-	<i>Nemata</i>	Bourbeuse River
-	<i>Oligochaeta</i>	Boone Creek
-	-	Bourbeuse River
-	-	Brush Creek
-	-	Dry Fork Bourbeuse River
-	-	Red Oak Creek

Brush Creek	5	97				<i>Lampsilis siliquoidea</i>	Fatmucket
Bourbeuse River	6	97				<i>Lampsilis siliquoidea</i>	Fatmucket
Dry Fork Creek	4	97		D		<i>Lampsilis siliquoidea</i>	Fatmucket
Bourbeuse River	6	97				<i>Lampsilis teres</i>	Yellow sandshell
Bourbeuse River	6	97				<i>Lampsilis teres anodonta</i>	
Bourbeuse River	6	97				<i>Lasmigona costata</i>	Fluted shell
Bourbeuse River	6	97		D		<i>Lasmigona c. complanata</i>	White heelsplitter
Bourbeuse River	6	97				<i>Leptodea fragilis</i>	Fragile papershell
Bourbeuse River	6	97	C2		#	<i>Leptodea leptodon</i>	Scaleshell
Bourbeuse River	6	97				<i>Ligumia recta</i>	Black sandshell
Bourbeuse River	6	97				<i>Megaloniais nervosa</i>	Washboard
Bourbeuse River	6	97				<i>Obliquaria reflexa</i>	Threehorn wartyback
Bourbeuse River	6	97				<i>Pleurobema sintoxia</i>	Round pigtoe
Bourbeuse River	6	97			E	<i>Plethobasus cyphus</i>	Sheepnose
Bourbeuse River	6	97				<i>Potamilus alatus</i>	Pink heelsplitter
Bourbeuse River	6	97				<i>Potamilus ohioensis</i>	Pink papershell
Bourbeuse River	6	97				<i>Pyganodon grandis grandis</i>	Giant floater

<i>Bourbeuse River</i>	6	97				<i>Quadrula pustulosa</i>	<i>Pimpleback</i>
Bourbeuse River	6	97				<i>Quadrula metanevra</i>	Monkeyface
Bourbeuse River	6	97		D		<i>Quadrula quadrula</i>	Mapleleaf
Bourbeuse River	6	97				<i>Strophitus undulatus</i>	Squawfoot
Bourbeuse River	6	97				<i>Toxolasma parvus</i>	Lilliput
Bourbeuse River	6	97				<i>Tritogonia verrucosa</i>	Pistolgrip
Bourbeuse River	6	97				<i>Truncilla donaciformis</i>	Fawnsfoot
Bourbeuse River	6	97				<i>Truncilla truncata</i>	Deertoe
Bourbeuse River	6	97				<i>Utterbackia imbecillis</i>	Paper pondshell
Bourbeuse River	6	97				<i>Venustaconcha e. ellipsiformis</i>	Ellipse
Brush Creek	4	97				<i>Venustaconcha e. ellipsiformis</i>	Ellipse

Bourbeuse River below Spring Creek year round. These trout range up and down the river some distance from Spring Creek during the cold weather months. Several small trout were captured in the run below Noser Mill during a March sample. Only trout in the Bourbeuse River are available to most anglers, as trespass rights are strictly controlled along Spring Creek and the Kratz Spring Branch.

Longear sunfish are common throughout the Bourbeuse River, though few grow large enough to harvest. Bluegill are found in the slower portions of the large pools and many exceed seven inches. Black and white crappie occur in the Bourbeuse River, though black crappie are the dominant species. Like rock bass, they are not evenly distributed but are abundant when located, especially in the segment below the Goodes Mill Dam.

A total of 39 species of mussels have been collected in various historic surveys of the Bourbeuse River and three of its tributaries, Brush Creek, Dry Fork, and Little Bourbeuse River (Buchanan 1980). Thirty-seven living mussels species of the 39 species were collected in the 1977 and 1978 survey (Buchanan 1980) of the watershed (Table 21).

Cumberlandia monodonta (Missouri species of conservation concern) and *Cyclonaias tuberculata* were collected in previous surveys but only as dead specimens in the 1977 and 1978 survey. In the 1977 and 1978 Bourbeuse River survey, Buchanan noted that the main stem Bourbeuse River had favorable habitat for naiades throughout its reach, only a few sites were completely devoid of mussels. The *Lampsilis radiata luteola* was the most abundant (largest % composition) within the Bourbeuse River watershed and all its tributary watersheds (Table 21). It may be found in almost any type of substrate from moderate to slow moving water (Oesch 1995). The *Lampsilis ventricosa* and *Anodonta g. grandis* were well represented in all watersheds.

In a more recent surveys in the Bourbeuse River and two of its tributaries, Brush Creek and Dry Fork, 31 living mussel species and five dead mussel species were collected by MDC Fisheries Research from 1994-97 (Table 22). In the 1997 survey 26 sites were assessed, and 18 sites were reassessed to compare to the 1977 and 1978 survey (Roberts and Bruenderman 1999). Five new species, *Lampsilis siliquioidea*, *Pleurobema sintoxia*, *Pyganodon grandis grandis*, and *Utterbackia imbecillis*, were discovered in neither the historic surveys nor the 1977 and 1978 survey but were found in the 1997 survey of the Bourbeuse River. *Anodonta imbecillis*, *Anodonta g. grandis*, *Simpsonaias ambigua*, *Amblema p. plicata*, *Pleurobema coccineum*, *Plagiola lineolata*, *Ligumia subrostrata*, *Lampsilis radiata luteola*, *Lampsilis ventricosa*, and *Lampsilis reeviana brittsi* were not collected in the 1997 survey but were found in the 1977 and 1978 surveys. *Cyclonaias tuberculata* was collected as a dead specimen in the 1977 and 1978 survey, but in the 1997 survey, researchers discovered live specimens. *Quadrula quadrula* and *Strophitus undulatus* were collected in the historic surveys but not in the 1977 and 1978 survey. Four state-listed species of conservation concern, *Alasmodonta marginata*, *Epioblasma triquetra*, *Leptodea leptodon*, and *Plethobasus cyphus* were discovered in the main stem Bourbeuse River. The two Bourbeuse River tributaries were home to few mussel species, only *Lampsilis siliquioidea*, *Venustaconcha e. ellipsiformis*, and the *Amblema plicata* were collected.

In the 1997 survey, the most abundant living mussel species in the Bourbeuse River from most to least abundant were *Actinonaias ligamentina carinata*, *Venustachoncha ellipsiformis ellipsiformis*, *Pleurobema sintoxia*, *Quadrula pustulosa*, and *Lampsilis siliquioidea* (Roberts and Bruenderman 1999). As stated above, the most abundant species in the 1977 and 1978 survey was *Lampsilis radiata luteola*. While relative abundance of mussels within the 18 reassessed sites was lower in the 1997 survey than in the 1977 and 1978 survey, mussel abundance within the new survey sites was comparable with abundance within 1977 and 1978 survey sites. Changes in species composition and abundance in the Bourbeuse River have been attributed to many factors, such as accelerated erosion, water quality degradation, in-stream gravel mining, and channelization. In addition, natural causes of decline, such as disease and drought, impact mussel species composition and abundance. Site selection and sampling methods can also affect estimation of species composition and abundance.

Some notable differences in species were reported in the Bourbeuse River as compared to the Big and Meramec rivers. Buchanan (1980) found that the *Lampsilis radiata luteola*, uncommon in the Big and Meramec rivers, comprised 29.7% of the living mussels collected in the Bourbeuse River. Buchanan also found that the dominant species located in Brush Creek, Dry Fork, and the Little Bourbeuse River were different from those of Courtois Creek, Huzzah Creek, and the Mineral Fork subwatersheds. Nine species (*Lampsilis radiata luteola*, *Actinonaias ligamentina carinata*, *Lampsilis ventricosa*, *Elliptio dilatata*, *Venustaconcha e. ellipsiformis*, *Amblema p. plicata*, *Fusconaia flava*, *Anodonta grandis grandis*, and *Pleurobema coccineum*) comprised 83.3% of the living naiades collected in Bourbeuse River. In the 1997 survey by Roberts and Bruenderman, *Cumberlandia monodonta* comprised a higher portion of individuals in the Meramec River than in the Bourbeuse or Big rivers. *Cumberlandia monodonta*, *Amblema p. plicata*, and *Megalonaias nervosa* were less common in the Bourbeuse River than in the Big and Meramec rivers, while *Venustachoncha ellipsiformis ellipsiformis* was more common.

Freshwater mussels are declining at an alarming rate throughout North America, and have been for many decades (Bruenderman, personal communication). A combination of factors are responsible for the decline in the Bourbeuse River mussel community since it was last sampled 20 years ago. The shifting unstable stream bottom and the excessive siltation, caused by poor land-use practices are not tolerable to mussels (Bruenderman 1998). Bruenderman believes that the mussel decline has been ongoing and that reproductive failure has gone unnoticed because the remaining adults have created the illusion of healthy conditions.

Crayfish

Table 26. Angler total hours fished and average catch rates of the Bourbeuse River and other streams in the area (Fleener 1988).

Stream Name	Total Fish	Total Hours	Fish/Hour
Upper Meramec River, Lower 13 miles Huzzah Creek, and Lower 15 miles Courtois Creek	15,499	86,390	0.18
Lower 141 miles Big River and Lower 5 miles Mineral Fork	13,916	75,130	0.19
Lower 147 miles Bourbeuse River	23,508	80,380	0.29
Lower 117 miles Meramec River	89,525	202,880	0.44

During surveys conducted from 1983-86, Fisheries Research collected 5 species of crayfish in the Bourbeuse River watershed. Table 23 contains a summary of the streams surveyed, the number of specimens, and the % composition of species at each survey site. The spothanded crayfish (*Orconectes punctimanus*) was collected at each of the survey sites throughout the watershed.

Found in association with the spothanded crayfish, the golden crayfish (***Orconectes luteus***) often was more abundant than the spothanded crayfish.

The northern crayfish (***Orconectes virilis***), which is well distributed throughout the state (Pflieger 1996), was found in abundance at a site on Webber Creek in the Lower Bourbeuse River HU. Crayfish species diversity was best at Webber Creek in the Lower Bourbeuse River HU (Table 24). Richness was highest on Brush Creek where there were three species of crayfish, and the number of specimens were fairly even among the three species.

Benthic Insects and Other Invertebrates

In a 1964 Missouri Department of Natural Resources water quality report, benthic invertebrate sampling provided indication of water quality conditions of the watershed (Table 25). Using biological indicators such as benthic invertebrates, biologists were able to rate the Bourbeuse River watershed stream segments near sampling stations. Pollution intolerant benthic invertebrates are the stonefly, caddisfly, mayfly, and gilled snails. The slightly pollution tolerant forms are the dragonfly and the damselfly nymphs (see list on last page of Table 25). At the Highway B Bridge of the Bourbeuse River in Phelps County, biologists reported fauna representing clean water. One such fauna, the mayfly, *Stenonema tripunctatum*, was found in great numbers. At two Bourbeuse River sites, near Strain and Franklin County Highway H Bridge and the Noser Mill, benthic fauna were and unpolluted conditions (MDNR 1964). Various intolerant forms of invertebrates were found at the Bourbeuse River Union station and Bourbeuse River confluence with the Meramec River station. Altogether, 43 types of organisms at the Union station and 57 types at the confluence station were found (MDNR 1964).

Tributaries to the Bourbeuse River such as Brush Creek, Dry Fork, Red Oak Creek, and Boone Creek were sampled for the same pollution indicators. Brush Creek had high production of macroinvertebrates, including sensitive forms of Ephemeroptera, Trichoptera, and to a lesser extent, Plecoptera. In the remaining three tributary sample sites, biologists concluded that the presence of a number of the sensitive organisms in sufficient quantity was a good indication of the high quality of the sampling station. However, a particularly alarming find was the absence of mussels in the Red Oak Creek and Brush Creek sampling stations. Heavy metals from an Owensville plating plant were the likely cause in the Red Oak Creek area (MDNR 1964). No explanation was given for the lack of mussels in the Brush Creek sampling station, although in all cases it is unknown whether any mussels were ever present.

The disappearance of some fish species from the Bourbeuse River watershed is due to several factors, but the largest contributor may be habitat alteration. A locational list of the sensitive species (see Habitat Section, Rare and Endangered Species) within the watershed can be found within the Natural Heritage Database (the database is updated periodically with recent locations and new species). In 1995-96 fish collections, the highfin carpsucker (*Carpionodes velifer*), state-listed species of conservation concern, was collected.

Highfin Carpsucker. The highfin carpsucker is considered rare in Missouri and over the years has become less common (Pflieger 1997). The highfin carpsucker prefers clear water, firm bottoms, and is less tolerant of turbidity and siltation than other carpsuckers. In the 1996 collection, the highfin carpsucker was collected in the Bourbeuse River (T43N, R1E, S27, 34, 35).

Two species, mottled sculpin and silverjaw minnow, that were species of concern prior to 1998 are no longer being monitored by MDC because of improvements in their numbers.

Mottled Sculpin. The mottled sculpin occurs to the exclusion of the Ozark sculpin in the Meramec River subwatersheds (Pflieger 1997). The mottled sculpin favors cold-water habitat and is often found in spring branches. In 1963 and 1995, the mottled sculpin was collected in Spring Creek (T41N, R2W, S4).

Silverjaw Minnow. The silverjaw minnow has a limited distribution in Missouri, and is found in shallow, sandy stretches of clear permanent-flowing streams that are either in the Meramec system or direct tributaries of the Mississippi (Pflieger 1997). Collected in 1963 at Spring Creek (T41N, R2W, S4), the silverjaw minnow was again collected in the 1995 at the same site. In the 1995 collection year, the silverjaw minnow was also found at a site on Big Creek (T42N, R3W, S15).

According to Pflieger (1997), the silverjaw shiner seems to be the ecological counterpart to the bigmouth shiner and replaces this species in the clearer and more stable streams of the Mississippi Valley from Missouri eastward. The bigmouth shiner has not been collected in the Bourbeuse River since 1963 (Table 20).

Pallid Shiner. The pallid shiner has not been collected on the Bourbeuse River since 1941. Pflieger (1997) noted two locations on the Bourbeuse River where the pallid shiner was found. The last collection of this species was in 1957 within the Lower Meramec River subwatershed. It is likely this species is extirpated from Missouri.

A survey conducted from 1981-82 on the lower 147 miles of the Bourbeuse River found that all types of fishing (pole and line, set line, and gigging) made up about 29% of all visits (Fleener 1988). Although the Meramec River watershed saw more total recreational use

Table 27. Bourbeuse River 1994 Smallmouth Bass population parameters (%).

	Goodes Mill to the Mouth (%)	Union to Goodes Mill (%)	Mayer's to Union (%)	Reiker to Mayer's (%)	Noser Mill to Reiker (%)	Peter's Ford to Noser Mill (%)	Mill Rock to Wenkel Ford (%)
Smallmouth							
PSD¹	9.1	61.8	48.3	28.6	20.8	62.5	50.0
RSD²⁻¹²	9.1	49.1	33.3	20.8	16.7	50.0	25.0
RSD-14	9.1	29.1	16.7	6.5	10.4	18.8	12.5
RSD-15	9.1	18.2	6.7	3.9	8.3	12.5	6.3
RSD-16	9.1	12.7	5.0	2.6	6.3	0.0	0.0
RSD-17	9.1	9.1	3.3	0.0	4.2	0.0	0.0
RSD-18	0.0	0.0	1.7	0.0	2.1	0.0	0.0
Largemouth							
PSD	66.7	50.0	50.0	83.3	72.7	38.5	66.7
RSD-14	33.3	0.0	50.0	50.0	18.2	30.0	33.3
RSD-15	26.7	0.0	50.0	50.0	9.1	15.4	33.3
RSD-16	20.0	0.0	16.7	33.3	0.0	15.4	33.3
RSD-17	13.3	0.0	16.7	16.7	0.0	7.7	33.3
RSD-18	6.7	0.0	0.0	16.7	0.0	0.0	33.3
Spotted bass							
PSD	30.7	69.2	0.0	50.0	100.0	0.0	0.0
RSD-12	20.5	7.7	0.0	50.0	100.0	0.0	0.0
RSD-14	4.5	7.7	0.0	0.0	0.0	0.0	0.0
RSD-15	1.1	7.7	0.0	0.0	0.0	0.0	0.0

RSD-16	0.0	7.7	0.0	0.0	0.0	0.0	0.0
Smallmouth	9.6	78.6	90.9	90.6	80.0	55.2	84.2
Largemouth	13.2	2.9	9.1	7.1	18.3	44.8	15.8
Spotted	77.2	18.6	0.0	2.4	1.7	0.0	0.0

% composition stock³

	Above Mill Rock (%)	Above Mint Spring (%)	All Combined (%)
Smallmouth			
PSD	14.3	0.0	37.7
RSD-12	10.7	0.0	27.8
RSD-14	7.1	0.0	14.1
RSD-15	0.0	0.0	8.0
RSD-16	0.0	0.0	5.1
RSD-17	0.0	0.0	3.2
RSD-18	0.0	0.0	0.6
Largemouth			
PSD	42.9	12.5	53.5
RSD-14	14.3	0.0	26.8
RSD-15	14.3	0.0	21.1
RSD-16	14.3	0.0	14.1
RSD-17	14.3	0.0	9.9
RSD-18	0.0	0.0	4.2
SpottedBass			

PSD	0.0	0.0	36.5
RSD-12	0.0	0.0	20.2
RSD-14	0.0	0.0	4.8
RSD-15	0.0	0.0	1.9
RSD-16	0.0	0.0	1.0
Smallmouth	80.0	20.0	64.1
Largemouth	20.0	80.0	14.5
Spotted Bass	0.0	0.0	21.3

¹Equation: PSD or Proportional Stock Density = (quality size fish)/(stock size fish of 7-8")

²Equation: RSD or Relative Stock Density = (quality equal to 12, 14 inches, etc)/ stock size)

³Equation: % Composition Stock = percentage of total stock size fish that are smallmouth, largemouth, or spotted bass.

during its survey period, the Bourbeuse River survey segment had more angler use than the Meramec River watershed. In the survey segment of the Bourbeuse River, pole-and-line fishing was popular, making up 25% of all visits to the area (Fleener 1988).

When compared to the other stream systems in the area, angler catch rate of the Bourbeuse River in fish per hour was second to the Meramec River (Table 26). The angler catch rate for the lower 147 miles of the Bourbeuse River was 0.29 fish/hour compared 0.44 in the lower 117 miles of the Meramec River.

The only recent angler survey conducted for the Bourbeuse River watershed was a phone interview conducted by Weithman in 1991 (see Land Use Section, Recreation). No recent creel surveys have been conducted in the Bourbeuse River watershed.

No commercial harvest of fish or mussels is allowed in the Bourbeuse River watershed (Wildlife Code of Missouri 1999).

The Bourbeuse River was sampled using boom-mounted electrofishing equipment in 1994-1996 to assess the potential for special management of the smallmouth bass population beyond the 12-inch minimum length limit and six bass daily creel limit. River access points divide the river into nine reaches of varying lengths. In 1994, a portion of each reach was electrofished. Table 27 summarizes the 1994 population parameters for each of the black bass species. Electrofishing effort was concentrated on reaches between Noser Mill and Goodes Mill in 1995 (Table 28) and 1996 (Table 29). In 1994, spotted bass were the dominant species in the three samples collected below Goodes Mill (a physical barrier), however, spotted bass were found just below the Noser Mill Dam, the upstream-most sample site in 1995 and 1996. Smallmouth bass PSD ranged from 35.6 - 39.8% for all sample sites combined for the three years sampled. Similarly, RSD-14 ranged from 9.2 - 14.1%, RSD-15 from 5.3 - 8.0%, and RSD-18 from 0.6 - 1.5%. The reach from Reiker Ford Access to Goodes Mill consistently had high smallmouth bass PSD and RSD values.

The population parameters for the Bourbeuse River smallmouth bass compare favorably to some other streams (Table 30). For example, in 1997 the Big Piney River regulated zone had a PSD of 29.7%, RSD-14 of 8.8%, RSD-15 of 5.8%, and a RSD-18 of 0.2%. Also, the 1973 Courtois Creek PSD was 37%, RSD-14, 8%, and RSD-15, 4%. The fall 1991 Courtois Creek PSD was 39%, RSD-14, 8%, and RSD-15, 6%.

A total of 1,264 smallmouth bass scales were analyzed during the study (Table 30). Bourbeuse River smallmouth attain 12 inches by age five. Growth rates were variable at older ages with smallmouth reaching 15 inches by age seven or eight and 18 inches by age nine.

A tagging study was initiated in 1995 and repeated in 1996, to identify anglers and determine the harvest rate of smallmouth bass. A tagging study approach was used because multiple access points on private land made a probability creel unworkable and a roving creel was not practical for other reasons. One hundred legal (>12-inch) smallmouth bass were tagged in spring 1995, and 95 legal smallmouth bass were tagged in spring 1996. Fish were tagged in a 34-mile segment bounded by Door Ford and Goodes Mill (Figure 15). Almost one half of these tags were in the reach from Reicker's Ford to Mayer's Landing (4.9 tags/mile). Twenty-eight tags were returned in 1995, and 16 tags were returned in 1996. The Bourbeuse River was above normal water stage and muddy during the spring of 1996, which could account for the difference. Thirty-five different anglers returned tags. Seven anglers caught more than one tagged smallmouth bass, only one of these seven anglers harvested the smallmouth bass they caught. Overall, 7% of the bass tagged in 1995 were harvested, and 8% of the bass tagged in 1996 were harvested.

The Bourbeuse River black bass populations are protected by a 12-inch minimum length limit. In addition, black bass must be released immediately after being caught from March 1 through the Friday before the fourth Saturday in May. All other species are managed by the standard statewide fishing regulations.

Table 28. Bourbeuse River 1995 Smallmouth Bass population parameters (%).

	Union to Goodes Mill	Mayer's to Union	Reiker to Mayer's	Noser Mill to Reiker	All Combined
Smallmouth					
PSD¹	37.5	30.8	40.8	32.1	36.5
RSD²⁻¹²	27.8	18.3	26.7	22.6	24.1
RSD-14	15.3	8.3	9.4	7.5	9.9
RSD-15	12.5	2.5	5.2	5.7	5.7
RSD-16	8.3	1.7	3.7	5.7	4.1
RSD-17	1.4	0.8	1.6	5.7	1.8
RSD-18	1.4	0.0	1.0	3.8	1.1
Largemouth					
PSD	8.3	50.0	52.6	60.0	45.5
RSD-14	8.3	40.0	36.8	33.3	31.8
RSD-15	8.3	35.0	26.3	20.0	24.2
RSD-16	8.3	25.0	21.1	0.0	15.2
RSD-17	8.3	15.0	10.5	0.0	9.1
RSD-18	8.3	10.0	10.5	0.0	7.6
Spotted Bass					
PSD	47.6	0.0	75.0	0.0	46.4

RSD-12	33.3	0.0	50.0	0.0	32.1
RSD-14	0.0	0.0	0.0	0.0	0.0
RSD-15	0.0	0.0	0.0	0.0	0.0
RSD-16	0.0	0.0	0.0	0.0	0.0
RSD-17	0.0	0.0	0.0	0.0	0.0
RSD-18	0.0	0.0	0.0	0.0	0.0
% composition stock³					
Smallmouth	68.6	83.9	89.3	77.9	82.3
Largemouth	11.4	14.0	8.9	22.1	12.5
Spotted Bass	20.0	2.1	1.9	0.0	5.3

¹Equation: PSD or Proportional Stock Density = (quality size fish)/(stock size fish of 7-8")

²Equation: RSD or Relative Stock Density = (quality equal to 12, 14 inches, etc)/ stock size)

³Equation: % Composition Stock = percentage of total stock size fish that are smallmouth, largemouth, or spotted bass.

Table 29. Bourbeuse River 1996 Smallmouth Bass population parameters (%).

	Union to Goodes Mill (%)	Mayer's to Union (%)	Reickers to Mayer's (%)	Noser Mill to Reickers (%)	All Combined (%)
Smallmouth					
PSD¹	45.6	46.1	35.3	20.0	35.6
RSD²⁻¹²	27.9	33.7	25.3	8.0	23.6
RSD-14	17.6	15.7	8.1	4.0	10.0
RSD-15	14.7	13.5	5.9	1.0	7.5
RSD-16	13.2	10.1	3.6	1.0	5.6
RSD-17	5.9	6.7	2.7	0.0	3.3
RSD-18	1.5	6.7	0.0	0.0	1.5
Largemouth					
PSD	37.5	50.0	60.0	61.5	54.1
RSD-14	25.0	20.0	40.0	15.4	26.2
RSD-15	25.0	20.0	20.0	7.7	18.0
RSD-16	25.0	15.0	20.0	0.0	14.8
RSD-17	25.0	10.0	20.0	0.0	13.1
RSD-18	12.5	5.0	10.0	0.0	6.6
Spotted Bass					

PSD	28.6	42.9	29.2	33.3	31.1
RSD-12	19.0	14.3	16.7	33.3	19.7
RSD-14	4.8	0.0	8.3	11.1	6.6
RSD-15	0.0	0.0	0.0	11.1	1.6
RSD-16	0.0	0.0	0.0	0.0	0.0
RSD-17	0.0	0.0	0.0	0.0	0.0
RSD-18	0.0	0.0	0.0	0.0	0.0
% composition stock³					
Smallmouth	70.1	76.7	83.4	82.0	79.7
Largemouth	8.2	17.2	7.5	10.7	10.2
Spotted Bass	21.6	6.0	9.1	7.4	10.2

¹Equation: PSD or Proportional Stock Density = (quality size fish)/(stock size fish of 7-8")

²Equation: RSD or Relative Stock Density = (quality equal to 12, 14 inches, etc)/ stock size)

³Equation: % Composition Stock = percentage of total stock size fish that are smallmouth, largemouth, or spotted bass.

Table 30. A summary comparison of the Bourbeuse River smallmouth bass parameters with Courtois Creek and selected Smallmouth Bass Management Areas.

	Bour-beuse 1994	Bour-beuse 1995	Bour-beuse 1996	Courtois 1973	Courtois 1991	Big Piney 1997	Meramec 1996	Big 1996
PSD¹	38	40	36	37	39	30	32	33
RSD²-12	28	26	24	25	23	20	23	26
RSD-14	14	9	10	8	8	9	--	--
RSD-15	8	5	8	4	6	6	6	14
RSD-18	0.6	1.4	1.5	0.2	0.2	0.2	0.5	5

¹Equation: PSD or Proportional Stock Density = (quality size fish)/(stock size fish of 7-8")

²Equation: RSD or Relative Stock Density = (quality equal to 12, 14 inches, etc)/(stock size)

LEGEND



MISS 1/00

Figure 15. Bourbeuse River smallmouth bass tag returns, total tags available, and fish harvested.